Term Project Proposal

EE102-02

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MEMORY GAME

Introduction:

The main purpose of this experiment is to create a project by combining BASYS3 FPGA and analog components.

"Memory Game" is an optional single or multi-player mind game. The rules of the game are following;

MASTERMIND MODE:

- The game has a default of 50 levels, and it starts when the player presses a button.
- After the game starts, the computer will blink a color on the computer screen. The player will choose the same color by using BASYS3 buttons.
- If the player chooses the same color as the computer, the player passes the level, and the computer adds another element to the color sequence and shows the sequence to the user.
- The player will try to choose the colors correctly again, and the game will go on until the player enters a wrong sequence at any level.

an example game is the following:

Example Game:

BASYS3: RED (first element)

Player : RED (correct)

BASYS3: RED (correct) -YELLOW (new element)

Player: RED (correct) -YELLOW (correct)

BASYS3: RED (correct) -YELLOW (correct) -GREEN (new element)

Player: RED (correct) -YELLOW (correct) -BLUE (false: game is over, scored 2 levels)

RIVALRY MODE:

- The game starts with Player 1's color choice (Player 1 will do it by pressing one of the five buttons on the BASYS3 where each of the buttons matches with a different color)
- After Player 1 starts the game, the turn will be passed to the Player. Player 2 will first push the buttons to light on the color that the first players picked. Then choose another color to increase the number of the elements in the sequence by one. Finally, hand the device over to Player 1.
- This time Player 1 will first push the buttons in the correct order to light on the correct colors, which was first picked by Player 1, then Player 2. These will be the first three moves of the game
- The game will last until one of the players enter the sequence wrong. Then the other player will win the game.

an example game is the following:

Example Game:

Player 1: RED (first element)

Player 2: RED (correct) -YELLOW (new element)

Player 1: RED (correct) -YELLOW (correct) -GREEN (new element)

Player 2: RED (correct) -YELLOW (correct) -GREEN (correct) -GREEN (new element)

Player 1: RED (correct) -YELLOW (correct) -GREEN (correct) -BLUE (false: game is over, Player 2 won)

During the game, different screens will show up on the monitor by using VGA like the following

“READY FOR THE NEXT STAGE”

“PLAYER 1’s TURN”

“PLAYER 2’s TURN”

“WRONG!!!: PLAYER 1 WON”

“PICK A COLOR TO START”

Also, the game interface will be visible on the screen. The estimated time and volume of the buzzer will be adjustable.

Some example screens are added to the extras part

A Buzzer or a loudspeaker will generate a sound when players press buttons or before the game starts a short music will be played; if possible, different notes will be picked for each color and game status.

Proposed Design:

On the VGA screen, there will be five circles with colors. When the button corresponding to a color is pushed, the color will change to a brighter tone to create the selected effect.

There will be a time on the upper part of the screen, and it will show the elapsed time playing the game. Also, the game mode will be selected from the main screen.

The buzzer will create sounds when a button is pressed, and it will sing a short melody on the starting screen if there is enough time. The potentiometer will control the volume of the buzzer or the loudspeaker. An input pin will send the signal to the analog input, and the volume of the buzzer/loudspeaker will also be displayed on the screen.

Required Components:

- BASYS3 FPGA
- Buzzer or Loudspeaker
- A Potentiometer
- Breadboard and Jumper Cables

Progress Demo

The algorithm of the Mastermind Mode will be prepared. Necessary buttons and switches will be set to play the game mod on the screen.

VGA screen will be designed. Five rounds with different colors will be drawn by using bitmaps.

The buzzer module will be connected to the buttons but only give sounds with a single note. A buzzer sound level bar will be added to the screen. A potentiometer is also added to control the volume of a buzzer.

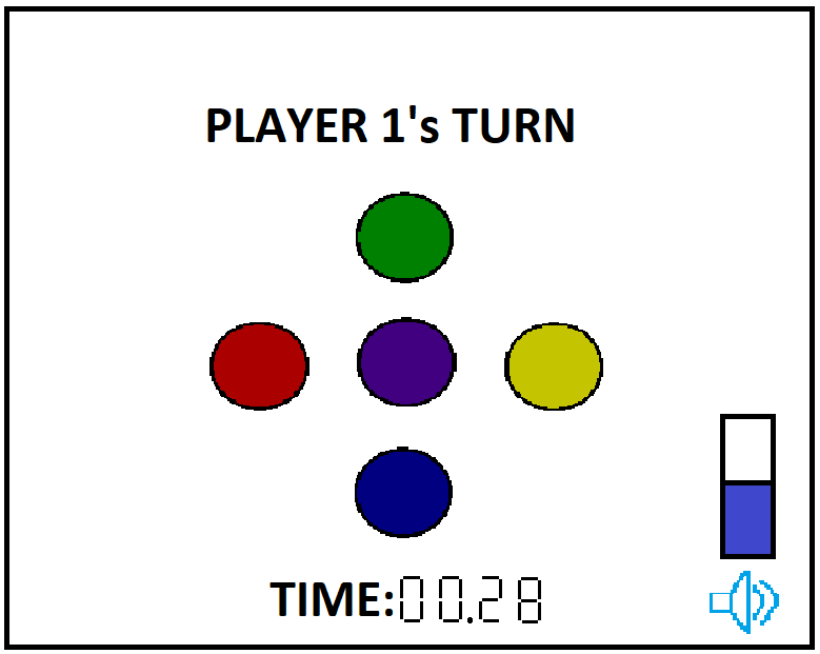
Final Demo

A game time will be added to the screen. The time counter will be created by using a clock.

The algorithm of the Rivalry Mode will be prepared.

Different toned outputs will be assigned for each button and by that each color. There will be a background music loop while the device waits for a player to start the game.

EXTRAS



(Image 1: Example Screen on the Monitor)